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ABSTRACT

Changes in the content, scope, and methods of education--both in and outside the classroom--in the new high-information high-communication electronic world society are discussed. Specific areas of discussion are changes in work and leisure, the electronic schoolroom, a curriculum for the new world, new modes of awareness, using the electronic surround, creating and organizing new electronic education for schools and the public, a system for never-ending continuing education for the whole society, and implications and specific responsibilities for the National Institute of Education. (CMV)

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# THE NEW AGE: LEARNING AND TEACHING IN THE ELECTRONIC SOCIETY

by

John Platt

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# THE NEW AGE: LEARNING AND TEACHING IN THE ELECTRONIC SOCIETY

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Domain Addressed:

Changes in the content, scope, and methods of education, in the schoolroom and out, in our new high-information high-communication electronic society around the world.

Nature of the Transformation:

Changes in Work and Leisure. Statistically, over half of the jobs in the U. S. Economy are now "tertiary" or information-handling jobs such as sales, service, information, and communication. More and more of these jobs are now computerized or electronic, and we live increasingly in an "Electronic Surround", as McLuhan has called it, of data-processing by banks and stores, with credit cards; computers and pocket calculators for societal and personal problem-solving; telephone and television, with global satellites, recorders, electronic games, videotapes; stereo radio, records, tapes; citizens'-band radios; and so on. In our leisure, "Parkinson's Law"holds, and "Television expands to fill the available time", so that Americans, on the average, watch television more than 4 hours a day, or for more than half of their leisure time. Canadians and Japanese spend even more time on it, and of course particular groups in our society watch for much longer hours, such as housewives, children, the old, the sick, the unemployed, and people in the ghetto. It is estimated that most children have watched 3000 to 4000 hours of TV before they start the first grade, and that even by the end of high school they have spent more hours watching television than they have spent in school. This is spreading rapidly around the globe, because television is the cheapest way of spending time that human beings have ever invented -- about one to two cents per person per day, hundreds of times cheaper than a car, and a thousand times cheaper than a teacher. It has been estimated that by 1980, even in the underdeveloped regions of Asia, Africa, and Latin America, the average eighteen-year-old will have seen 18,000 hours of television, and that the 1980 Olympic Games in Moscow will be watched by 2 billion people, or half of the human race.

Whatever the ills of TV, or the bad consequences of this level of immersion in it, it enlarges our world and links us. There have been recent reports suggesting that children in the first grade now know very many more words than they knew in 1900, and if this is so, it is surely due in large part to their exposure for thousands of hours to the diversity of TV. From age 2 to 92, with TV debates and news, we have learned about space, ecology, oceans, pollution, oil, energy, the limits to growth, the anti-War movement, Watergate and the constitutional problem, women's liberation, and so on and on for dozens of major social and political issues which were not taught in disciplinary courses or in the schools anywhere -- until children and students insisted that they be brought into the classroom.

Obviously in such a world, formal learning and teaching must take the Electronic Surround into account in a central way, and realize that it is dealing with a new kind of student,needing new content, new methods, new training, and a continual reeducation outside the schoolroom for all of life.

The mission of the educational system in this society, or in any society, is to teach children and adults as effectively as possible what they need to know to reach their full potential as human beings and citizens. But with such rapid changes still going on in the larger society, it is not obvious how to do this, particularly when we consider the new technologies and new global problems that grade-school children today may have to deal with as citizens in the years from 1990 to 2050. It will take many continuing rounds of discussions, and continuing intense research on individual and group behavior and learning in this new electronic world, and thousands of experiments and pilot projects to look for the best approaches -- even though many of these are bound to fail (as technological pilot projects do). We will need our best forecasting of the social and educational patterns and consequences, and our best insights -- from the freshest to the most experienced -- and it will be of central importance not to be either dogmatic or exclusive in our approaches. But for a brief preliminary sketch, six or seven areas of major change in formal education for such a society leap to the mind.

The Aware Schoolroom. The least that existing schools can do is to be aware of the ongoing electronic world around them, to amplify and explain the issues it brings before us all, and to try to correct and compensate for some of its dangers and shortcomings. Good schools and good teachers do this already on a large scale, as they did in the days of radio and newspapers. Such a program as "Roots", which reached 80 million U.S. viewers for 6 nights in a row, provides stimulus and material for analysis in geography, history, and social science. An exciting curriculum in the social sciences could be built around major TV programs, fleshed out by library materials and community discussions; and with a little more effort, in engineering and the biological sciences; and in music and art and literature, although the coverage here might be rather spotty and unsystematic.

The mobilization of national experts to provide background and enrichment materials, on a few days' notice, to make better use of such nation-wide TV programs when they are first presented, might be a fairly inexpensive way of increasing the excitement of the schoolroom and its sense of relevance to the world, for schools all over the country. In many cases, the cost might even be supported by the sponsors, as part of their advertising, although adequate controls to insure the impartiality and academic quality of such background materials would be important.

But it is important not to deal with first-graders as though they had not seen "Sesame Street", or with high-schoolers as though they had not seen space flights.

The Electronic Schoolroom. The use of these new devices in the schoolroom has been widely discussed and does not need to be elaborated here. Classroom television, including central broadcasting of programs, videotapes for learning skills, cassettes and disks for whole libraries of lectures and background films and materials in the near future, two-way television for discussions and questions, responsive games and computerized learning systems like PLATO at the University of Illinois, language tapes, and personalized learning programs with instant reinforcement for progress at one's own rate, will all be fitted into the classroom of the future in their own way. The role of the human teacher may come to be more and more personalized help, clarification, and fitting things into a larger philosophy and context. And the teacher also may come to find teaching simplified and helped by similar electronic preparation and materials and video examples of effective classroom methods, if such materials can be prepared on a national scale.

A Curriculum for the New World. What curriculum is needed to teach citizens the understanding of their new world and how to participate in its practical work and play? What old parts can or should be dropped? What new approaches or subject matters should be especially emphasized? These are questions for intense debate between conservatives and liberals, and the debates will probably even be politicized between groups with different attitudes towards ecology or economics or technology or social and political change. And the curriculum choices will certainly change continually as knowledge and civic needs change in every decade -- as one can see by comparing our emphases in 1977 with those in 1967, when our eyes were fixed on space and the cold war and the Vietnam war, and there was little interest in ecology and pollution, oil, energy, the problems of cities, schools and students, busing, abortions, sexual freedom, birth control, women's liberation and affirmative action, and religious reform. These have been subjects of intense debate and concern and violence, changing the relation of schools to students and the community and the law, as well as the internal curriculum, from Universities down to grade schools, and not only in the U.S. but around the world. We should at least try to think about what 1987 will need that will be different still.

Some questions:

In an electric-typewriter world, how much handwriting does a child need to learn? With the best TV-teaching, how much of our reading-comprehension becomes clumsy and obsolete? With 7-place pocket calculators for less than $5, and computers at every check-out counter, how much rote-multiplication, long division, complex fractions, or logarithms are desirable, to frighten most children away from mathematics? Or at a higher level, if most jobs will be information-handling, what vocational skills should we teach, animal husbandry or video-reporting, shorthand or word-processing, double-entry bookkeeping or computer-programming? In the hard vocations themselves, should students learn particular skills, or learn to learn, with updated video instructions when needed for new materials and processes? Shall it be geometry and engineering drawings, or ingenious electronic space-games and the construction of Fuller domes? Language-texts, or tapes? History and art and music lectures, or a great systematic series of videocassettes?

Of the great new disciplines of the last few years, several can be brought down to the high-school level, such as the new biology, the new psychology, and limits-to-growth computer simulations of global change. Others can be made vivid and exciting at the junior-high-school level, such as the sociobiology of many animal species, or the new geology with its models of great continental plates sliding under each other, or the new astronomy with its space exploration and strange stars and galactic clouds. And probably we should make room for some of the integrative ideas that C. H. Waddington has listed in his recent book, Tools of Thought, such as feedback, and chain reactions with growth and decay (applying to nuclear reactions, biological growth, business cycles, and the decline of cultures), and ecological interactions, and systems analysis, and information theory, and how to handle information overload. Many of these would be valuable subjects for teachers to learn, both professionally and personally.

New Modes of Awareness. McLuhan more than anyone else has emphasized the change in our mental processes, in our imaging and learning and understanding and our linking to each other, that necessarily comes with the change from the historic linear and sequential information of speech and books to the moving-field high-information space presentation of moving pictures and television, which is more like dance, ritual, drama, and learning by imitation. It is not private and interiorized and analytical, but publicly shared and externalized and impressionistic. The change to a world of students for whom this has been the dominant mode of relationship and learning since infancy cannot help but force changes in schools, classrooms, teachers, materials, and methods, though it is not clear what these changes will eventually be. Probably some leaders will try to make the school experience as much like the TV as possible, to capitalize on the transfer of learning modes, while others will try to make it as different as possible, to try to preserve the bookish and analytical skills. Or possibly some new way will be invented, that uses the emotional involvement of the TV screen together with something like split-screen methods to sharpen up alternatives and make complex relations clearer or conclusions more convincing. Obviously this is a most important area for research contracts and pilot studies with careful evaluations.

The future of books and of libraries of books in this new electronic world is of course a subject fraught with emotion. We have loved them for two thousand years, and quite rightly, for their rapid spread of culture, their diversity, and their privacy, for private entertainment or private dissent from the official dogma, or private sharing with a special friend. We have come to equate intellect with letters, and have almost forgotten that the humanities, poetry, history, drama, philosophy -- the philosophy of Socrates and Jesus -- were originally oral and representational and did not need written symbols for their complex thought. (Mathematics and the sciences are the disciplines that would have been helpless without symbolic lines and letters.) Undoubtedly books will never die out, and libraries will continue growing in size and complexity. But probably in an electronic era, books and written records will be relegated increasingly to reference functions accessible mainly to specialists; while the active records and work of the world, in enormously increased volume, are carried on tape and disk for the computer and the screen with instant access. This effective "end of the era of books" may still be a generation away for us, but for something like a billion and a half people in the world, the transition will be straight from a village oral tradition to a television oral-and-demonstration tradition without ever passing through the era of books and literacy. And the necessity of writing software programs to teach everything by television to these non-literates, whether in the Third World or in our own society, cannot help but speed up the transition away from books for the rest of us.

Another aspect of television that the schools will have to incorporate is its non-punitive character. The TV screen has no school compulsion, no truant officer, no rap on the knuckles or parental scolding or staying after school to force the viewer to stay in the seat and to pay attention; it has only its own interest and build-up, second by second, to hold him or her -- that is, its instant positive reinforcement, in Skinnerian terms, for continuing to watch. As Skinner has shown, no punitive method can compete with such an attractive system, for interest, modification of behavior and attitudes, and learning. The schools will only learn to compete with the power of TV when they begin to create their own video programs, building in the same instant-by-instant fascination so that they do not need to depend at all on the remnants of compulsion that are still in use today. This may be one of the most difficult emotional points for schools of education and for traditional teachers to understand and believe in and learn to practice, but it is a necessary key to education in an Electronic Surround.

Finally, the sense of human relationship and global relationship is something that the electronic world has given us on a scale we never had before. This may seem a strange observation when we think how disembodied the voices are that we hear on the radio, or how detached and artificial the images and people on the screen often seem. But they represent a world larger and older than the family or the village night, stretching to Washington or to the moon, or years into the vanished past. And with habit, they become more real and more important than the family, as the war comes nightly to our dinner table, and we all walk on the moon together or attend the Kennedy funeral. We become both more global and more individualized, as we link up with other groups with the same backgrounds and interests, whether they are other nuclear protesters or tennis buffs or ethnic groups or liberated women. By comparison, this makes most textbooks and teaching materials today seem old-fashioned and stereotyped. These outreach and identification tendencies will increase with more diverse programming, two-way cable television, special-interest electronic games, and individualized videocassettes or disks with libraries of programs. A precursor of this kind is the mathematical games and "Thinker's Tournament" program between schools in Ann Arbor and other Michigan cities, using cable television and conference telephone. Teachers might find such links extremely valuable, especially in dealing with new program material used in many schools at once.

Using the Electronic Surround. Schools will surely move on to the central and systematic use of the electronic media as a high-quality core and universal resource for all their work. They will begin to work with broadcasters and public and educational networks to build courses around such serials as "Sesame Street", "The Electric Company" for younger children, and " Civilization", "The Ascent of Man", and "Roots" for older ones. They will solve the copyright and cost problems to build libraries of videocassettes and disks, available like books for study or repeat study by anyone at any time. Athletic teams, musicians, and debaters will correct their errors and improve performance rapidly by watching their own videotapes with instant replay and slow motion; and all teachers could profitably do the same. A major part of teachers'-college curriculums may be devoted to teaching how to use all these media effectively. These possibilities have been talked about, exaggerated and belittled, for many years, but I think most older educators have not realized how rapidly and universally they will come as electronic hardware becomes cheaper than seats and books.

Creating and Organizing New Electronic Education for Schools and the Public. And then a major part of the educational endeavor for students and for the nation will come to be the take-over and development of these new media for education in a comprehensive way, as an intellectual and experiential feast rather than as crumbs from the table of broadcasters. The planning and initial steps toward this cannot begin too soon, for the time and the need, and perhaps the money, are already here.

A reminder about economics may be helpful. Because the programs can be reused indefinitely, the software costs of electronic education will go down even more dramatically than their hardware costs, in the long run, even with elaborate planning, selected teachers, and the best media technology. When we consider the 30 million children who have learned the alphabet and numbers from "Sesame Street" in the last 10 years, the $8 million cost of creating the initial series works out to 2 cents per child per hour -- the cheapest method of early education ever devised. Education is now a $100 billion operation, the largest industry in the U.S. (and in the world, according to UN statistics), and the leadership to create a consortium of schools and colleges and government agencies and foundations to use even part of 1 percent of this budget to produce the electronic educational feast would generate a national and world transformation.

So it is time for education to transform itself to its own electronic producer and programmer, using experimental mixes of media for the most effective learning, with its own content and standards and pace, across the full curricula for all ages

This will of course leap outside the schoolroom and the 9-to-4 school day, into home and office and conference center and by satellite around the world, with learning materials from age 2 to 92. We do not often realize how minor technologies shape our whole social system. The technique of writing down symbols for speech led to the alphabet and the book and printing and publishing and libraries; and to formal education of every child for years in learning this elite and difficult reading and writing; and so to teachers to read from the book and to dictate what was to be copied; and to schoolrooms and buildings and classes and exams and grades and truant officers and teachers' colleges and government support and lunch programs,and a total change in the meaning of childhood.and the ways of learning from adults by doing.

With the displacement of the book by electronic images, the screen and the tape and the computer, much of this clumsy apparatus of learning may simply vanish away as being inefficient, coercive, and dull. People will refuse to support its economic and social costs and its role in helping to create bored and hostile teen-agers knowing nothing of the work of the world, and actively hating math and physics and English and poetry and music. Massive electronic education will have its problems too, as we are constantly reminded, but at least they are different problems as the walls of the classroom disappear. But the non-coercive medium that can teach anyone who watches, old or young, by fascination alone, also has enormous strengths and creative potential and power for individual and social change that we can capture and master if we act now.

A System for Never-Ending Continuing Education of the Whole Society. Our new technological powers and our new intensities of communication and interaction around the world have moved us toward a self-transforming society, a cybernetic society that chooses its own goals deliberately, rejecting this technology or structure and demanding others that will take us closer to where we want to go. This is the meaning of the protest movements and the World Bank, the blocking of the supersonic transport and the new research on solar energy, the demand for public accountability and the human rights movement. At the heart of such a society must be a continual on-going education in new ways and a continual informed debate over new goals. Only the electronic media can reach throughout such a society fast enough and completely enough, changing all ages together, to make this kind of rapid self-transformation possible. But the media material must be based on the best library materials and the best experts and teachers and the best teaching methods, if we are not to be led astray by hasty and trivial and commercial sensationalism. This means that this continual reeducation of the public must be integrated into, and a major part of, the whole educational enterprise. Even the universities now have a majority of their enrollments outside the traditional 18-to-22-year age bracket; and it would be well today to turn all our thinking around and see the primary mission as the continual education of the whole society, with only one component of it being devoted to the special education of the young, and only a fraction of that done by traditional teaching with books and formal classes in schoolrooms and schoolbuildings. And this approach is particularly well adapted to the universality, the emotional involvement, and the differentiated special interests of the electronic media. The greatest educators of the future will be the greatest producers, directors, and masters of the media, educating the world -- and the young along with everybody else.

What Work To Do:

What Work Is Now Going On in This Domain? Briefly, nothing. Blending education into the electronics revolution will require hundreds of times as much analysis, debate, research, and leadership as we now have. But a few seminal writings are:

Marshall McLuhan, The Gutenberg Galaxy, 1963; Understanding Media, 1965. (Eccentric and gnomic utterances, but penetrating.)

Neil P. Hurley, S.J., "Communications in the Twilight of the Twentieth Century", Forum for Correspondence and Contact 8 (2), 44-52 (october 1976) ("Due to man's growing dependence on a 'man-machine' combination of sight, sound and data signals, any serious discussion of man and society in 1986 must be predicated on the assumption that technology will be the underlying foundation of personal, social and political life... Indeed, the discovery of the 'electro-magnetic spectrum' is both a prodigious 'biological' as well as 'sociological' event [Quoting Teilhard de Chardin], for it means that the human race will soon function with a common, technologically extended, central nervous system akin to that evolutionary achievement of 'eye-ear-memory-brain'...)

Neil P. Hurley, S. J., "Television and the Movies", The Commonweal (June 18, 1976), 401-403.

John McHale, "The Future of Television: Some Theoretical Considerations", Forum for Correspondence and Contact 8 (2), 53-58 (October 1976)

Ernest L. Boyer, "Higher Education for All, Through Old Age" New York Times Op-Ed Page, April 8, 1975. (And other articles).

Stanley G. Smith and Bruce Arne Sherwood,"Educational Uses of the PLATO Computer System", Science 192, 342-352 (23 April 1976) (A"Model-T"system, but suggesting the enormous potential ahead.)

Videoscope (Incorporating Radical Software), a new Journal, 1977, in New York and London.
("...to feature articles on the latest opportunity for the independent video and film producer to cooperate with public television stations in a joint effort to make television less a diversion and more a relevant part of our society.")

Layman E. Allen, "Thinkers' Tournament", Mental Health Research Institute, University of Michigan, Ann Arbor.
(Adapting his well-known'academic learning games' [Wff-n-Proof, Equations, On-Sets, Queries and Theories] to cable TV and telephone tournaments between different schools.)

What Might Be Expected to Result? At present, one can only look for straws in the wind, and speculate, as I have above. But massive serious effort and leadership, either in many seminal programs such as "The Ascent of Man", or "Roots" for the educational or public broadcasting network, or in the creation of an educational consortium or NIE operation to initiate and oversee and use such efforts, might change the situation overnight.

Implications for the National Institute of Education:

What Should NIE Do? : The first implication for NIE is negative: Do not assume that "Education Equals Schooling Only," when this enormous amount of education of the whole public by the media is going on outside all the time, and is voluntarily chosen and eagerly devoured.

Spend some appreciable fraction of your money -- 10%? 20%? -- on analysis, conferences, research, and pilot programs of all forms of educational interaction with the Electronic Surround.

Specific Areas to Work On:

1. The Electronic Schoolroom. Bring together, catalog, and index all the work and forecasts and evaluations that have already been made. Examine the barriers, successes and failures, costs (and future costs), and work out a systematic approach for initiating the next round of study and implementation and assessment. It will probably take years to find out the best methods and mixes and their full potential and long-range consequences, so this probably requires the kind of on-going commitment represented by a whole section or division within NIE, with permanent staff.

2. Curriculum for the New World. In an electronic and computer society, how should we change the curriculum for greatest effectiveness? What could be dropped, or what else should be taught, and how, and how fast?

3. Using Existing Electronic Media and Inputs Most Effectively in the Schools.

4. Creating New Electronic Education for Schools and the Public.

These are parallel questions for intense debate and conferences and experiments, with close collaboration between forward-looking educators and front-rank media people, but of course the second of these will require much more initial funding and organization and planning. It is quite a separate question from (1) above, and would of course require an even larger section or division within NIE, and permanent staff.

5. Full Use of the Resources of Our Present System and of the Media, to Transform to a Whole System for the Continuing Education of the Whole Society. The first steps toward this transformation could grow out of the work in area (4) above, which might become a major part of the work and organizational structure of NIE in 10 or 15 years, as the older forms of education merge into the new. But of course this total educational transformation is too large for any single agency, and will require loose networks of dozens or hundreds of organizational units working at different levels or on different aspects of the total program. What NIE can do is to provide leadership and awareness of this shift toward whole on-going education, and to serve as a channel for catalytic funding, a communications center and clearing house.

But just being aware of the possibility of (5), of how fast we are moving toward a continual-education self-transforming society, already takes us halfway toward understanding and solving the thousand other problems of this difficult transition period.

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